

acid with ammonium molybdate reagent. When ignited it turned brown, and when the brown material was digested in acid the solution contained aluminum but gave no reaction for copper.

Under the microscope the determination of the optical properties is difficult owing to the small size of the grains of the blue material, their aggregate character, and the confusion with the intergrown sericite. Determination of the refractive indices is especially difficult but the mean index, β , is about 1.654. The birefringence is moderately low and the grains perpendicular to an optic axis do not extinguish in white light but owing to the high dispersion give abnormal blue and liver-brown colors. The mineral is biaxial and negative, with $2V$ very small. The dispersion, $r < v$, is very strong. There is a suggestion of imperfect cleavage in one direction and the grains are distinctly pleochroic with X colorless, Y and Z blue. These optical properties differ from those given by Larsen for lazulite in that the indices are higher and the axial angle is smaller. The mineral agrees with lazulite in dispersion, optical sign, and pleochroism. The optical properties other than sign agree more nearly with turquoise but that mineral is optically positive. This difference and the fact that no copper could be detected support the identification of the blue phosphate as lazulite. The higher indices and smaller axial angle are doubtless traceable to difference in composition between this Bolivian material and the ordinary Georgia lazulite upon which the data in Larsen's tables are based.

The possibility that the mineral is an abnormally biaxial manganapatite was considered but rejected. After long boiling with 1:1 nitric acid the blue material was not dissolved, and the extract gave a barely perceptible manganese color with ammonium persulphate. The extract reacted for phosphoric acid but this is doubtless due to a small amount of apatite of ordinary character which occurs as minute grains and prisms scattered through the sericitic material.

PALEONTOLOGY.—*A new early Ordovician sponge fauna.*¹ R. S. BASSLER, U. S. National Museum.

Although a few individual species are found sometimes in great numbers, Paleozoic sponges are comparatively rare. The discovery of an entirely new fauna comprising two families, one of them represented by five new genera, is therefore of unusual interest. This exceptional

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assemblage of new sponges was discovered in early Ordovician rocks of Chazyan age by Messrs. H. G. Clinton and Percy Train of Manhattan, Nevada, two enthusiastic students of the geology of this state, who transmitted the specimens to me for determination and presented a generous set to the U. S. National Museum upon condition that they be described. The exact locality of these new sponges is in McMonigal Canyon, about 10 miles west of the Devil's Punch Bowl in Monitor Valley and about 60 miles north of Manhattan, Nevada. According to Mr. Train, the limestones outcropping here are several thousand feet thick and form the main backbone of the Monitor Range on the west side of the valley. All the new sponges occur near the valley floor in the lower few hundred feet of the series.

The specimens are found in somewhat shaly limestone, often attached to thin fossiliferous layers containing brachiopods, trilobites, and other invertebrates of decided Chazyan aspect. Among the various forms of trilobites noted, several are new species of exceptional interest, and one occurs abundantly which upon close study cannot be distinguished from *Pliomerops barrandei* Billings, originally described from the Chazyan of Newfoundland. Curiously enough, most of the sponges belong to the family Archaeoscyphidae, hitherto represented only in strata in the easternmost portion of North America.

As Messrs. Clinton and Train have a considerable number of these new sponges which they wish to send out to students, they have asked me to issue this preliminary note in advance of a more detailed, illustrated article so that they may have names for their specimens. All of their specimens can be classified under two Early Paleozoic families: first, the Anthaspidellidae Ulrich and Everett, represented by *Anthaspidella* and *Streptosolen*; and second, the Archaeoscyphidae Rauff, hitherto known from a single genus and species but now augmented by five new genera. The following brief descriptions give the general features of these new forms.

SILICISPONGIAE

Order TETRACTINELLIDA

Family ARCHAEOscyPHIDAE Rauff

Sponge attached, simple or branching, ranging from saucer and funnel shapes to turbinate and frondescent; simple or branched cloaca usually of considerable diameter; oscula represented by numerous, closely spaced, small pores penetrating the spicular tissue of the wall and opening on the outer surface at regular intervals. Spicular structure much as in the Anthaspidellidae.

Genus *Nevadocoelia*, n. gen.

Simple, erect, obconical, pedunculate sponges pierced throughout their length by a wide cloaca and marked on their outer surface by transverse ridges or rows of nodes.

Genotype.—*Nevadocoelia wistae*, n. sp.

Nevadocoelia wistae, n. sp.

Sponge elongate, as much as 12 centimeters in length and 4 centimeters in greatest width, tapering gradually towards the base, with the surface marked by undulating, more or less parallel transverse ridges, of which 7 occur in 3 centimeters.

The specific name is in honor of Miss Meta Wist of Manhattan, Nevada, in appreciation of her interest in the natural history of that state.

Nevadocoelia traini, n. sp.

Similar in growth to the preceding but with the surface marked by sharp nodes instead of transverse ridges. These nodes are arranged in somewhat irregular transverse rows and six of them occur on an average in 2 centimeters, measuring transversely.

Nevadocoelia grandis, n. sp.

Sponge not unlike *N. wistae* in structure but much larger. The diameter is 7.5 centimeters and the ridges stronger, with only 3.5 in 3 centimeters.

Nevadocoelia pulchra, n. sp.

Sponge 7 centimeters in diameter and more than 11 centimeters high with the cloaca 2 or more centimeters wide; marked by unusually large surface ridges which form wide, ascending, flange-like expansions and measure at least 1.5 centimeters distant from each other.

Genus *Lissocoelia*, n. gen.

Sponge consisting of smooth, cylindrical, hollow stems, branching at irregular intervals. Surface minutely porous and with the general structure of the family. Cloaca narrow but extending the full length of the sponge.

Genotype and only species.—*Lissocoelia ramosa*, n. sp.

Lissocoelia ramosa, n. sp.

Sponge smooth, branching, usually about 1.5 centimeters in diameter but increasing to 2 centimeters at a division point; the cloaca 0.5 centimeters wide. Surface smooth, marked by small rounded pores distributed equally throughout the spicular tissue.

Genus *Calycocoelia*, n. gen.

Sponge cup-shaped with the cloaca increasing in width from below upward and opening at the upper outer surface as a deep excavation. Surface smooth and exhibiting the general microscopic structure of the family.

Genotype and only species.—*Calycocoelia typicalis* n. sp.

Calycocoelia typicalis, n. sp.

The cup-shaped form, smooth surface, and wide cloaca of this species, 7 centimeters in diameter at the top and less than 4 near the base, characterize this interesting species.

Genus *Patellispongia*, n. gen.

Sponge as found in the rocks consisting of lamellar fragments, sometimes of considerable dimensions, but originally probably broad saucer-shaped expansions attached by a short stem. Under surface comparatively smooth, covered by a thick dermal tissue which when weathered shows regular canals or channels. Upper surface with numerous evenly spaced rounded pores surrounded by the usual spicular tissue.

Genotype.—*Patellispongia oculata*, n. sp.

Patellispongia oculata, n. sp.

This species forms broad lamellar expansions with the upper surface exhibiting numerous rather regularly spaced pores 1 millimeter in diameter with 6 to 7 in 10 millimeters.

Patellispongia clintoni, n. sp.

Sponge similar to the preceding in growth but the pores slightly larger and, more important from a specific standpoint, almost 5 millimeters apart.

Patellispongia minutipora, n. sp.

Sponge consisting of thin lamellae and differing particularly from other members of the genus in the minuteness of the pores, since at least 15 can be counted in 10 millimeters.

Genus *Hesperocoelia*, n. gen.

General structure similar to that of *Patellispongia* save that the broad saucer-shaped lamella of that genus is here represented by a flat, undulated, two-leaved frond pierced along the upper edge by a row of rounded or oval openings which constitute the cloaca.

Genotype.—*Hesperocoelia typicalis* n. sp.

Hesperocoelia typicalis, n. sp.

Sponge a flattened, flabellate frond more than 5 centimeters high and about 6 millimeters in thickness, traversed by longitudinal canals of varying diameter which emerge at the surface along the upper thin edge in a row of narrow openings, each about 3 millimeters long, spaced so that 5 occur in 20 millimeters. The usual pores in the spicular tissue show on both sides of the sponge with an average of 4 pores in 3 millimeters, measuring longitudinally.

Hesperocoelia undulata, n. sp.

This species differs decidedly from the preceding in that the openings along the upper edge of the sponge are round, 4 millimeters in diameter with about 3.5 in 20 millimeters. Moreover, the small pores penetrating the spicular tissue are more delicate and closely spaced.

Family ANTHASPIDELLIDAE Ulrich and Everett.

Genus ANTHASPIDELLA Ulrich and Everett.

This fine genus is represented by two very distinct new species which I have the pleasure of naming in honor of the discoverers of this new fauna.

Anthaspidella clintoni, n. sp.

Although related to *Anthaspidella scutula* Ulrich and Everett from the Black River (Platteville) limestone at Dixon, Illinois, in that it has the clusters consisting of the oscula and radiating canals comparatively small and close together, the present species differs in that the clusters measure 15 millimeters, on an average, from center to center.

Anthaspidella traini, n. sp.

Sponge suggesting *Anthaspidella florifera* Ulrich and Everett, from the Black River limestone at Dixon, Illinois, but differing in that the clusters are farther apart, averaging 25 millimeters from center to center.

Genus STREPTOSOLEN Ulrich and Everett.

Streptosolen occidentalis, n. sp.

Sponge with the form and general structure of *Streptosolen obccnicus* Ulrich and Everett, the genotype, from the Black River (Platteville) limestone at Dixon, Illinois, but differing in that the canals do not intertwine so much and the central osculum is much wider and has larger tubes.

BOTANY.—*The genus Hampea*.¹ PAUL C. STANDLEY, U. S. National Museum.

The genus *Hampea* consists of a small group of American trees and shrubs which has been referred by most authors to the family Bombacaceae, although others have believed its more natural position to be in the Malvaceae. The genus was based by Schlechtendal upon a single species, *H. integerrima*, described from Veracruz. In 1862 Triana and Planchon described a second species, *H. thespesioides*, from Colombia, and in 1886 Sereno Watson a third from Guatemala. A variety of *H. integerrima* was described from Costa Rica in 1899 by Capt. John Donnell Smith, and in 1923 I transferred to the genus a Mexican plant described as a *Thespesia* by Presl, and published a new species from the Yucatán Peninsula.

Practically all the scanty herbarium material of the genus has been referred without question to the original *H. integerrima*. Our representation of the genus has increased rapidly in recent years, and when an attempt was made recently to name two Central American specimens, it became evident that the group was badly in need of revision.

In the present treatment nine species are recognized, one indigenous in Colombia, the others ranging from Panama to southern Mexico.

Through the courtesy of Dr. B. L. Robinson the material of this genus in the Gray Herbarium has been lent for study by the writer.

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